



Press Release

TRUMPF introduces the next generation, rugged industrial VCSEL solutions for oxygen sensing

Oxygen sensing in industrial applications as gas sensing in power plants benefit from integrated and robust VCSEL solutions // Spectroscopic sensors with in-situ measurement in less than a second // No thermal sensitivity with temperature controlled VCSEL in TO packages // New oxygen sensing solutions with wavelengths of 760 nm and 763 nm with improved performance

Ulm, May 23, 2022 – TRUMPF Photonic Components, a global leader in VCSEL and photodiode solutions, is introducing its next generation of VCSEL for spectroscopic oxygen sensing. Spectroscopic sensing solutions can be claimed as the highest performing sensing technique to monitor relevant parameters such as oxygen concentration. The new generation of 760 nm and 763 nm VCSEL in TO packages even increase the performance reliability. This is enabled thanks to the TRUMPF its new state-of-the-art production and processing platform. The benefit of offering solutions at wavelengths of 760 nm and 763 nm is that there are no influences from background gases, as no gas other than oxygen shows high absorption at these emission wavelengths. “We provide integrated, smart VCSEL solutions for easy integration of the components into demanding production systems. TRUMPF not only contributes its laser-source know-how, but also combines it with application, optics and assembly know-how”, says Ralph Gudde, VP Marketing and Sales at TRUMPF Photonic Components.

O₂ sensing from the petroleum to the medical industry

The new 760 nm and 763 nm VCSEL solutions serve various industrial applications to detect oxygen concentration. “O₂ sensing solutions are not only used in demanding industrial environments, but also in automotive or medical settings. Our VCSEL solutions with active temperature and polarization control therefore offer a large detection range with high resolution and an accuracy of almost 100 percent”, explains Gudde. In power plants or the petroleum industry, for example, the VCSELs support exhaust gas analysis. If, on the other hand, thinking of the packaging industry, VCSELs support the determination of oxygen



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in sealed packages such as water bottles. The application fields extend to the medical sector, where the O₂ sensors are used in medical devices such as respirators, ventilators or incubators.

The well-established technique to serve these applications is the so-called “tunable diode laser absorption spectroscopy” (TDLAS). TDLAS and single-mode VCSELs are a perfect match. The VCSELs offer high accuracy and controllability with their absolute symmetrical beam shape, narrow line width and distinct polarization. Therefore, the VCSEL solutions enable TDLAS to be a high-performance sensing technique that offers unbeatable measurement speed with in-situ measurement in less than a second. Non-contact laser measurement covers a huge temperature range and allows determination of process pressure and temperature at the same time. This is made possible by the low thermal wavelength coefficient of the VCSEL material and the integrated thermoelectric cooler (TEC). The small size of the VCSEL combined with its increasing functionality make it the perfect solution to address the demand for hardware miniaturization.

Made for any environmental conditions

Integrated sensor solutions in a TO housing not only reduce system complexity and enable high-end sensing solutions with cost advantages. The hermetically sealed, rugged housing also minimizes the risk of damage that can be caused by external factors in demanding ambient conditions. Additionally, there is hardly any thermal sensitivity of the sensor as the packages are be equipped with integrated temperature control with TEC and thermistor. Applications demanding a large temperature window can be performed as the user can regulate the laser temperature precisely in order to control the wavelength.

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VCSEL in TO package

The hermetically sealed TO housing protects the electronics and allows easy handling and operation in demanding ambient conditions.



O2 sensing with VCSEL

The new generations of 760 nm and 763 nm VCSEL in the TO package increase the performance reliability of the O2 measurements.



Ralph Gudde, VP Marketing and Sales at TRUMPF Photonic Components

About TRUMPF Photonic Components

TRUMPF Photonic Components is a global technology leader, supplying VCSEL and photodiode solutions for consumer electronics, datacom, automotive, industrial sensing and heating markets. So far, it has shipped more than two billion VCSEL chips and photodiodes have been shipped worldwide. The staff continues to drive its technological know-how that has been established for over 20 years now in order to maintain its leadership position. The long-established technology was acquired by TRUMPF in 2019. The company has its headquarters in Ulm, Germany, with further sales locations in the Netherlands, China, Korea and the US.

TRUMPF Photonic Components belongs to the TRUMPF Group, a high-technology company that offers production solutions in the machine tool and laser sectors.

TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, and also for industrial lasers and metal 3D printing. In the 2020/21 fiscal year, the company employed some 14,800 people and generated sales



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of about 3.5 billion euros. With over 80 subsidiaries, the TRUMPF Group is represented in nearly every European country, in North America, South America and Asia. The company has production facilities in Germany, France, the United Kingdom, Italy, Austria, Switzerland, Poland, the Czech Republic, the United States, Mexico and China.

For more information about TRUMPF Photonic Components visit:

www.trumpf.com/s/VCSEL-solutions

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